




Original document

Combined structure for touch controller in liquid crystal display plate combined with touch board and liquid crystal display device assembly controller

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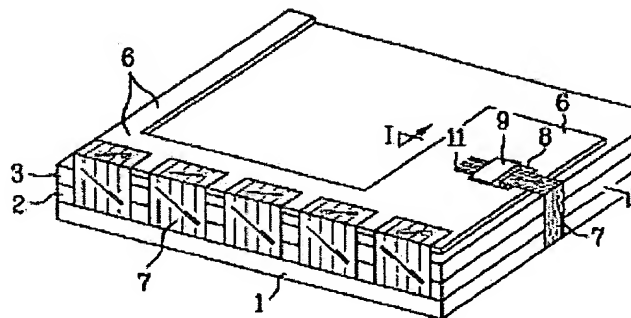
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The present invention provides a structure combining a touch controller with an LCD module controller in an LCD integrated with a touch panel, which can avoid a limitation on fitting space of the touch controller by integrating the touch controller and the LCD module controller on one printed circuit board (PCB) and improve signal line connection between the touch panel and the touch controller, to allow fabrication of a thinner LCD with the touch panel. The present invention provides a structure of combining a touch controller with an LCD module controller in an LCD integrated with a touch panel, the LCD having the touch panel, an LCD module, and a back light, including a PCB (Printed Circuit Board) on a rear surface of the back light, having the LCD module controller, and the touch controller integrated with the PCB.



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Description of corresponding document: **US2002089493**

[0001] This application claims the benefit of Korean Patent Application No. P2000-85764, filed on Dec 29, 2000, which is hereby incorporated by reference for all purposes as if fully set forth herein.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to an LCD (Liquid Crystal Display) panel integrated with a touch panel, herein referred to as a touch panel LCD, and more particularly, to a structure combining a touch controller with an LCD module controller of a touch panel LCD, which can avoid exceeding spatial limitations required for fitting the touch controller operably proximate the LCD module controller, and permit fabrication of a thin LCD.

[0004] 2. Discussion of the Related Art

[0005] In general, referring to FIGS. 1, and 2, a related art touch panel LCD is provided with a touch panel 1, an LCD module 2, and a back light 3. To operate the touch panel LCD, the touch panel 1 and the touch controller 4 are electrically connected by signal lines 7 and the touch controller 4 is electrically connected to the computer body 5. The related art touch panel LCD is provided with a separate touch panel 1, LCD module 2, touch controller 4, and computer body 5. Accordingly, the related art requires that a location, where the touch controller 4 is to be fitted and connected to the touch panel 1, is provided outside the touch panel 1 as shown in FIG. 2.

[0006] In the case of notebook computers or other devices having a touch panel LCD, which do not have such a space outside a touch panel for connecting to a touch controller, the touch controller must be fitted to a rear surface of the back light 3. However, a connector (not shown) used to connect the signal lines 7 from the touch panel 1 to the touch controller 4 has a height greater than an integrated circuit (IC) part 1 fixed to a PCB (Printed Circuit Board) 6 of the touch controller. Therefore, the height of the connector undesirably increases the total thickness of the touch panel LCD.

SUMMARY OF THE INVENTION

[0007] Accordingly, the present invention is directed to a structure combining a touch controller and an LCD module controller in a touch panel LCD that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

[0008] An advantage of the present invention provides a structure combining a touch controller and an LCD module controller in a touch panel LCD, which can avoid exceeding spatial limitations required for fitting the touch controller operably proximate the LCD module controller, improve signal line connection between the touch panel and the touch controller, and permit fabrication of a thin touch panel LCD.

[0009] Additional features and advantages of the invention will be set forth in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0010] To achieve these and other advantages and in accordance with the purpose of the present invention as embodied and broadly described, the structure combines a touch controller with an LCD module controller in a touch panel LCD, the touch panel LCD including a touch panel, an LCD module, and a back light having a PCB (Printed Circuit Board) mounted on a rear surface thereof, wherein the LCD module controller and the touch controller are integrated thereto.

[0011] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The accompanying drawings, which are included to provide a further understanding of the

invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

[0013] In the drawings:

[0014] FIG. 1 illustrates a schematic view of a related art system required for operation of an LCD with touch panel;

[0015] FIG. 2 illustrates a perspective rear view of a related art LCD with a touch panel;

[0016] FIG. 3 illustrates a perspective view of a disassembled a structure combining a touch controller with an LCD module controller in a touch panel LCD in accordance with the principles of the present invention;

[0017] FIG. 4 illustrates a perspective view of the signal lines connected to the connector in FIG. 3;

[0018] FIG. 5 illustrates a sectional view across line I-I in FIG. 4; and

[0019] FIG. 6 illustrates another perspective view according to the principles of the present invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

[0020] Reference will now be made in detail to an embodiment of the present invention, an example of which is illustrated in the accompanying drawings.

[0021] FIG. 3 illustrates a perspective view of a disassembled structure combining a touch controller with an LCD module controller in an LCD integrated with a touch panel, herein referred to as a touch panel LCD, in accordance principles of the present invention. FIG. 4 illustrates a perspective view showing signal lines 7 connected to the connector 9 in FIG. 3. FIG. 5 illustrates a sectional view across line I-I in FIG. 4. In accordance with the principles of the present invention, a structure combining a touch control with an LCD module controller in a touch panel LCD, includes a touch panel 1, an LCD module 2, and back light 3 with a PCB (Printed Circuit Board) 6 mounted on a rear surface of the liquid crystal display wherein the LCD module controller and the touch controller are integrated with the PCB 6. The PCB 6, having the LCD module controller and the touch controller integrated with the PCB 6, includes a connector inserting hole 8 to accommodate a connector 9 inserted thereinto. Terminals of the connector 9 are soldered to patterned lines on the PCB 6 to establish electrical connection 11 between the terminals and patterned lines.

[0022] The structure combining the touch controller with the LCD module controller in the touch panel LCD in accordance with the principles of the present invention will now be explained.

[0023] Referring to FIG. 3, an exemplary embodiment of the present invention integrates the LCD module controller (i.e., a source PCB, or a gate PCB) and the touch controller to one PCB 6.

[0024] Accordingly, a surface of the PCB 6, having parts 10 including ICs and the like fixed thereon and having the LCD module controller and the touch controller integrated thereto, may or may not be exposed. The latter case is shown in FIG. 3. When the surface of the PCB 6 is exposed, there is no problem in connecting the signal lines 7 from the touch panel 1 to the connector 9, even if the connector 9 is exposed to outside of the PCB 6. However, as shown in FIG. 5, when the surface of the PCB 6 is not exposed, many problems are encountered in connecting the signal lines 7 from the touch panel 1 to the connector 9.

[0025] Therefore, as shown in FIGS. 3-5, a connector inserting hole 8 is formed in the PCB 6 to accommodate a connector 9 inserted thereinto. Signal lines 7 from the touch panel 1 are then inserted in the connector 9 disposed within the depths of the connector inserting hole 8 and the touch panel 1 is in electrical communication with the touch controller.

[0026] Due to the related art connector being fitted to the rear surface of the PCB 6, the related art touch panel LCD has a total thickness equal to the sum of the thickness of the PCB 6 and a height of the connector 9. The total thickness of the touch panel LCD according to the principles of the present invention can be comparably reduced because the connector 9 is inserted within the connector inserting hole 8 formed in the PCB 6. Furthermore, the connector 9 can be inserted to a depth within the connector inserting hole such that the connector 9 is almost flush with respect to an exposed top major surface of the PCB 6.

[0027] FIG. 6 illustrates another perspective view according to the principles of the present invention in

which the signal lines 7 are disposed in a form different from the previous embodiment.

[0028] The signal lines 7, which are inserted in and electrically connected to the connector 9, may be be to reduce any electrical interference with the connector 9, with the patterned lines on the PCB, or with other IC parts 10 fitted thereto, or with the touch controller and the LCD module controller integrated thereto.

[0029] According to another principle of the present invention, the signal lines 7 are fixed intimately to top major surface of the PCB 6. Although not shown, a signal guide groove may be formed in the top major surface of the PCB 6, to prevent projection of the signal lines 7 from the top major surface of the PCB 6. Also, it is possible to change the location of the soldered electrical connection 11 provided between the connector 9 and the PCB 6 to the surface of the PCB 6 where to the IC parts are fixed. Accordingly, connector 9 may be inserted into the connector inserting hole 8 such that the connector does not protrude from the top major surface of the PCB 6.

[0030] As has been explained, the structure combining a touch controller with an LCD module controller in a touch panel LCD according to the principles of the present invention has the following advantages.

[0031] The present invention integrates a touch controller of a touch panel and an LCD module controller of an LCD module into one PCB of a touch panel LCD and improves a signal line connecting structure between the touch panel and the touch controller. Accordingly, the present invention can avoid exceeding spatial limitations required for fitting the touch panel and the touch controller within a notebook computer or other electronic device having a touch panel LCD, permit fabrication of a thin touch panel LCD, and enhance the reliability of the touch panel LCD product.

[0032] It will be apparent to those skilled in the art that various modifications and variations can be made in the structure of combining a touch controller with an LCD module controller in an LCD integrated with a touch panel of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

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Claims of corresponding document: **US2002089493**

What is claimed is:

1. A structure combining a touch controller and an LCD module controller in a touch panel LCD, the touch panel LCD comprising:
 - a touch panel;
 - an LCD module;
 - a back light; and
 - a printed circuit board on a rear surface of the back light, wherein the LCD module controller and the touch controller are integrated to the PCB.
2. The structure as claimed in claim 1, wherein the printed circuit board having the LCD module controller and the touch controller integrated thereto further comprises:
 - a connector inserting hole; and
 - a connector disposed within the connector inserting hole, the connector being connected to the printed circuit board.
3. The structure as claimed in claim 2, wherein the connector is disposed within the connector inserting hole such that the connector does not protrude from an exposed top major surface of the printed circuit board.

4. The structure as claimed in claim 2, wherein the connector is electrically connected to the printed circuit board via terminals of the connector.
5. The structure as claimed in claim 4, wherein the terminals of the connector are soldered to patterned lines on the printed circuit board.
6. The structure as claimed in claim 2, further comprising:
the touch panel comprising signal lines;
the connector comprising terminals, wherein the signal lines are disposed on a surface of the printed circuit board while being connected to the terminals of the connector.
7. The structure as claimed in claim 6, wherein the printed circuit board includes a guide groove, wherein the signal lines are disposed within the guide groove and do not project from an exposed major surface of the printed circuit board.
8. A touch panel LCD in an electronic device, the touch panel LCD combining a touch controller and an LCD module controller, the touch panel LCD comprising:
a touch panel;
an LCD module;
a back light; and
a printed circuit board over a rear surface of the back light; and
an LCD module controller and a touch controller integrated on the printed circuit board.
9. The touch panel LCD as claimed in claim 8, wherein the printed circuit board further comprises:
a connector inserting hole; and
a connector disposed within the connector inserting hole, the connector being connected to the printed circuit board.
10. The touch panel LCD as claimed in claim 9, wherein the connector is disposed within the connector inserting hole such that the connector does not protrude from an exposed top major surface of the printed circuit board.
11. The touch panel LCD as claimed in claim 9, wherein the connector is electrically connected to the printed circuit board via terminals of the connector.
12. The touch panel LCD as claimed in claim 11, wherein the terminals of the connector are soldered to patterned lines on the printed circuit board.
13. The touch panel LCD as claimed in claim 9, further comprising:
the touch panel comprising signal lines;
the connector comprising terminals, wherein the signal lines are disposed on a surface of the printed circuit board while being connected to the terminals of the connector.
14. The structure as claimed in claim 13, wherein the printed circuit board includes a guide groove, wherein the signal lines are disposed within the guide groove and do not project from an exposed major surface of the printed circuit board.
15. A method of fabricating a touch panel LCD in an electronic device combining a touch controller and an LCD module controller in a touch panel LCD, the method comprising:
providing a touch panel;

disposing an LCD module proximate the touch panel;
disposing a back light proximate the LCD module;
disposing a printed circuit board over a rear surface of the back light, wherein the printed circuit board comprises an LCD module controller and a touch controller integrated thereto, the printed circuit board being electrically connected to the touch panel.

16. The method according to claim 15, further comprising:
forming a connector inserting hole within the printed circuit board;
inserting a connector within the connector inserting hole; and
electrically connecting the printed circuit board to the touch panel via the connector.

17. The method according to claim 16, wherein the connector is inserted within the connector inserting hole such that the connector does not protrude from an exposed top major surface of the printed circuit board.

18. The method according to claim 16, further comprising:
the touch panel comprising signal lines electrically connecting to the connector;
the printed circuit board comprises a guide groove, the signal lines are disposed within the guide groove

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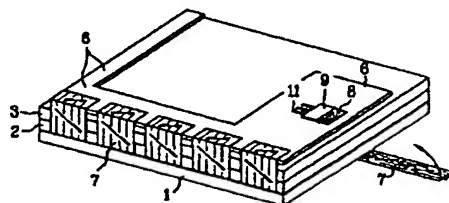
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[54] 发明名称 与触摸板结合的液晶显卡板中的触摸控制器与液晶显示器组件控制器的组合结构

[57] 摘要

本发明的目的是提供与触摸板结合的 LCD 中的触摸控制器和 LCD 组件控制器的组合结构,它通过把触摸控制器和 LCD 组件控制器集成在 PCB 上而避免了触摸控制器的安装空间限制,并改善了触摸板和触摸控制器之间的信号线连接,因此能制成更薄的带触摸板的 LCD。为实现发明目的,本发明提供一种与触摸板结合的 LCD 中的触摸控制器和 LCD 组件控制器的组合结构。所述 LCD 具有触摸板, LCD 组件机背照光源,在背照光源背面上设有集成有 LCD 组件控制器和触摸控制器的印刷电路板 PCB。



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权 利 要 求 书

1. 与触摸板结合的 LCD 中的触摸控制器和 LCD 组件控制器的组合结构，所述 LCD 具有触摸板，LCD 组件和背照光源，所述结构包括：

5 安装在背照光源背面上的 PCB（印刷电路板），所述 PCB 上集成有 LCD 组件控制器和触摸控制器。

2. 按权利要求 1 所述的结构，其中，集成有 LCD 组件控制器和触摸控制器的 PCB 上形成有连接件插孔，连接件插入该连接件插孔中，由此把连接件安装到 PCB 上。

10 3. 按权利要求 1 所述的结构，其中，插入安装在连接件插孔中的连接件不从 PCB 的表面突出。

4. 按权利要求 2 所述的结构，其中，连接件的引出端电连接到 PCB。

5. 按权利要求 4 所述的结构，其中，连接件的引出端焊接到在 PCB 上构成图形的引线上，从而电连接到 PCB。

15 6. 按权利要求 1 所述的结构，其中，从触摸板伸出的信号线在连接到连接件的引出端时紧密设置在 PCB 的表面上。

7. 按权利要求 1 所述的结构，其中，PCB 上形成有引导信号线通过的定向槽，以防止信号线伸出 PCB 表面。

说明书

与触摸板结合的液晶显卡板中的触摸控制器 与液晶显示器组件控制器的组合结构

5

技术领域

本发明涉及带触摸板的液晶显示板（LCD），更具体地说涉及在与触摸板相结合的液晶显示板（LCD）中触摸控制器和LCD组件控制器的组合结构，它不限制触摸控制器的安装空间，能制成总厚度更薄的LCD。

10

背景技术

参见图1和2，一般说来，带触摸板的LCD设有相互隔开的触摸板1，LCD组件2和背照光源3，为了使带触摸板的LCD工作，要求用信号线7 FPC连接触摸板1和触摸控制器4，而且，要求触摸控制器4电连接到计算机主机5。

15 即，现有的带触摸板的LCD设有相互隔开的触摸板1，LCD组件2，触摸控制器4和计算机主机5。因此，现有技术中要求有要连接到触摸板1的触摸控制器4安装用的固定位置，和根据触摸控制器4的固定安装位置确定的触摸板1用的信号线7的安装位置和长度，如图2所示，大多情况下这些安装位置都在触摸板1的区域之外。

20 因此，在没有这种触摸控制器安装空间的笔记本电脑的情况或类似情况下，要求将触摸控制器安装到背照光源3的背面上。但是，由于连接件的高度通常大于安装到触摸控制器的印刷电路板（PCB）6的IC的厚度，这就使带触摸板的LCD的总厚度更厚。

25 发明内容

因此，本发明提出一种与触摸板结合的LCD中的触摸控制器和LCD组件控制器的组合结构，它基本上避免了因现有技术中的限制和缺点造成的一个问题或多个问题。

5 本发明的目的是，提供与触摸板结合的LCD中的触摸控制器和LCD组件控制器的组合结构，它有避免触摸控制器的安装空间限制，能改善触摸板和触摸控制器之间的信号线连接，制成更薄的带触摸板的LCD。

以下的说明中将会说明本发明的其它特征和优点，其中部分特征和优点将从以下的说明中明显得出或通过实践本发明而悟出。用说明书、权利要求书和附图中特别说明的结构能达到和实现本发明的目的和其它优点。

10 为了达到这些和其它的发明优点，按本发明的目的，还如已实施和广义描述的那样与触摸板结合的LCD中的触摸控制器和LCD组件控制器的组合结构所涉及的LCD有触摸板、LCD组件和背照光源，还包括设有背照光源背面上的集成有LCD组件控制器和触摸控制器的PCB印刷电路板。

15 以上的一般性说明和以下的详细说明都只是示例性的和解释性的，其意图在于对要求保护的发明作更进一步的说明。

附图简述

20 为了更好理解发明而提供了附图，附图包括在本说明书中，并成为本发明书的一个组成部分，所述附图示出了发明实施例和说明书一起用于说明本发明的原理，附图中：

图1示出现有的操作带触摸板的LCD所需的系统的示意图；

图2是现有的带触摸板的LCD的背面透视图；

图3是按照本发明优选实施例的所述触摸板结合的LCD中的触摸板控制器和LCD组件控制器的组合结构的分解透视图；

25 图4是展示连接到图3中的连接件上的信号线状态的透视图；

图5是沿图4中I—I线的剖视图；

图6是按本发明的另一优选实施例的透视图。

优选实施例评述

5 现在参见附图中的实例详细描述本发明的优选实施例。图3是按照本发明优选实施例所述与触摸板结合的LCD中的触摸控制器和LCD组件控制器的组合结构的分解透视图。图4是展示连接到图3中的连接件上的信号线状态的透视图。图5是沿图4中I—I线的剖视图。按照本发明的优选实施例，具有触摸板1，LCD组件2和背照光源的，与触摸板结合的LCD中的触摸控制
10 器和LCD组件控制器的组件结构包括设在背照光源背面上的集成有LCD组件控制器和触摸控制器的PCB（印刷电路板）6。集成有LCD组件控制器和触摸控制器的PCB6上设有连接件插孔8，连接件9插入插孔8中，由此，把连接件9安装到PCB6上。连接件9的引出端用在PCB6上构成图形的引线焊接，使引出端与构成图形引线电连接。附图中没作解释的参考标记11表示
15 连接件9和PCB6之间的焊接部分。

现在说明按照本发明的优选实施例所述的，与触摸板结合的LCD中的触摸控制器和LCD组件控制器的组件结构。

参见图3，现有技术中，触摸控制器4，触摸板1和LCD组件2组装成各自的单元，本发明与现有技术的差别是，按照本发明的优选实施例，与触
20 摸板结合的LCD中的触摸控制器和LCD组件控制器的组合结构提出，将LCD组件控制器（即源PCB或相PCB），和触摸控制器集成到一个PCB6中。

本例中，如图3—5所示，安装有诸如IC等零件10的PCB6的表面可以露出，也可以不露出。安装有诸如IC等零件10的PCB6的表面露出时，即使连接件9露在PCB6的外边，从触摸板1连接到连接件9的信号线7的连接也没有
25 大问题。但是，如图5所示，当安装有诸如IC等零件10和集成有LCD组件控

制器和触摸板控制器的PCB6从触摸板1连接到连接杆9的信号线7的连接有很多限制。

因此，如图3—5所示，集成有触摸控制器和LCD组件控制器的PCB6中形成连接件插孔8。利用连接件插孔8的深度将连接件9安置在连接件插孔8中通过把触摸板1的信号线7插入安装到连接件插孔8中的连接件9内，便能容易地实现触摸板1和触摸控制器的连接。

即，在现有技术中，LCD的总厚度是PCB6的厚度加安装在PCB6表面上的连接件9的高度，因此，现有的LCD的总厚度较厚，而本发明的LCD的总厚度可以减薄，因为连接件9插入PCB6中形成的连接件插孔8中，连接件9几乎可从PCB6上突出。

图6是表示本发明的另一优选实施例的透视图，其中，用与上述实施例不同的形式安置信号线7。

即，由于在PCB上构成图形的引线，或安装在PCB上的其它IC零件10的影响，和由于PCB上集成在触摸控制器和LCD组件控制器，所以可将插入和连接到连接件9的信号线7适当弯曲。

信号线7最好是紧密安装在PCB6的顶表面上。与上述实施例不同，可在PCB6中形成信号线定向槽（图中未示出）。以便防止信号线7伸出PCB6的表面。而且，可把连接件9与PCB6之间的焊接部分换到与图5所示的安装IC零件的表面相反的PCB表面上，从而使插入连接件孔8中的连接件9不从PCB6的表面突出。

正如已描述过的，按照本发明所述与触摸板结合的LCD中的触摸控制器和LCD组件控制器的组件结构具有以下优点。

本发明中，把触摸板的触摸控制器和LCD组件控制器集成到触摸板的LCD中的一个PCB上，从而改善了触摸板与触摸板控制器之间的信号线连接结构。为此，本发明能避免触摸板和触摸控制器的安装空间限制，能制成

更薄的带触摸板的LCD，提高了带触摸板的LCD产品的可靠性。

本领域的技术人员应知道，在不脱离本发明精神和发明范围的情况下，本发明所述与触摸板结合的LCD中的触摸控制器和LCD组件控制器的组合结构还会有各种改型和变化。因此，本发明包括这些改型和变化，这些
5 改型机变化落入所附权利要求书及其等同物要求保护的发明范围内。

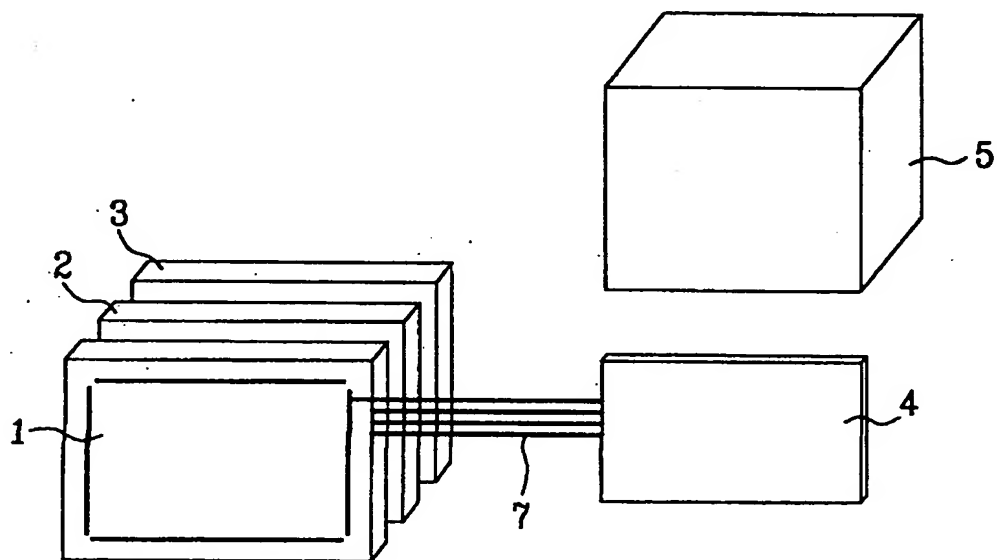


图1

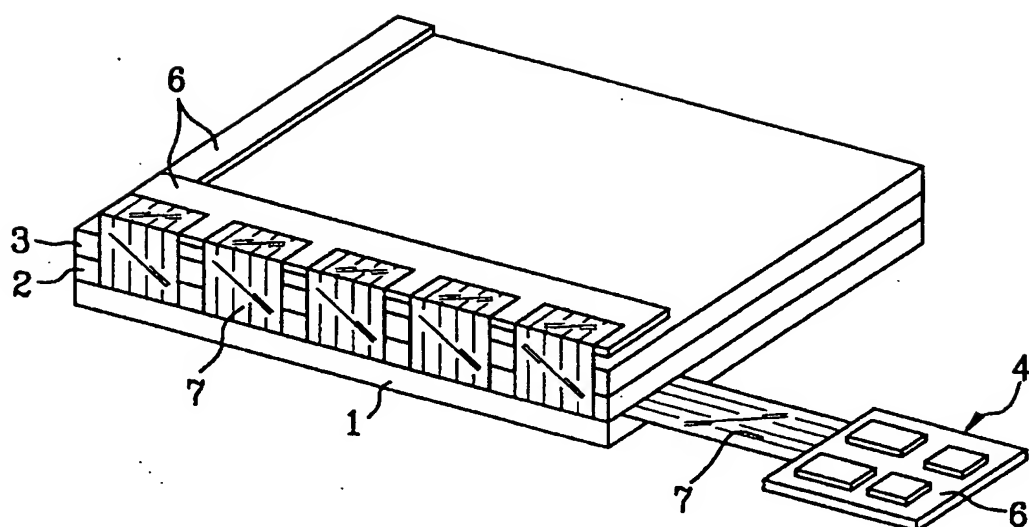


图 2

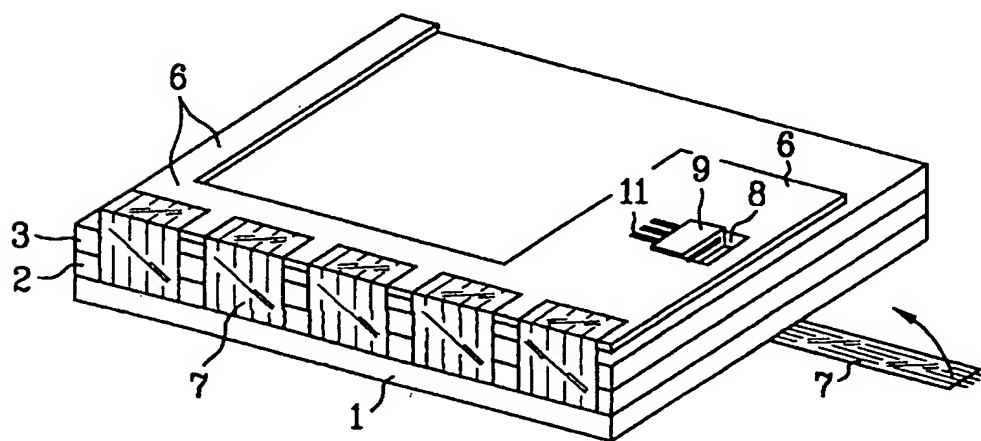


图 3

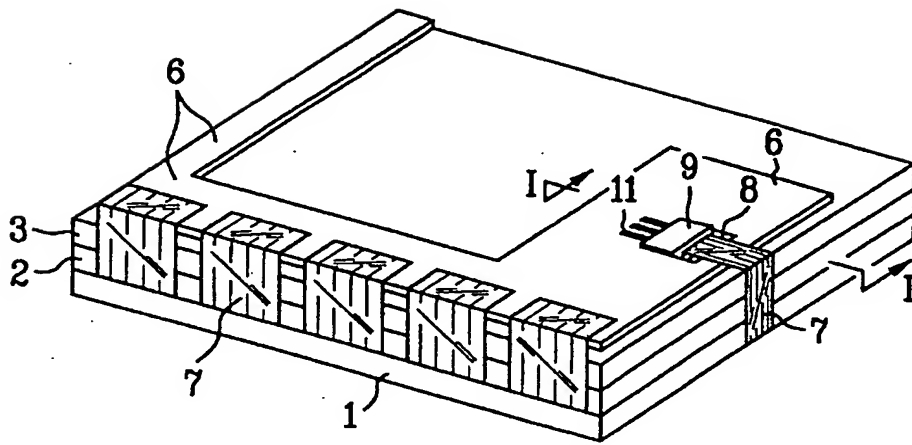


图 4

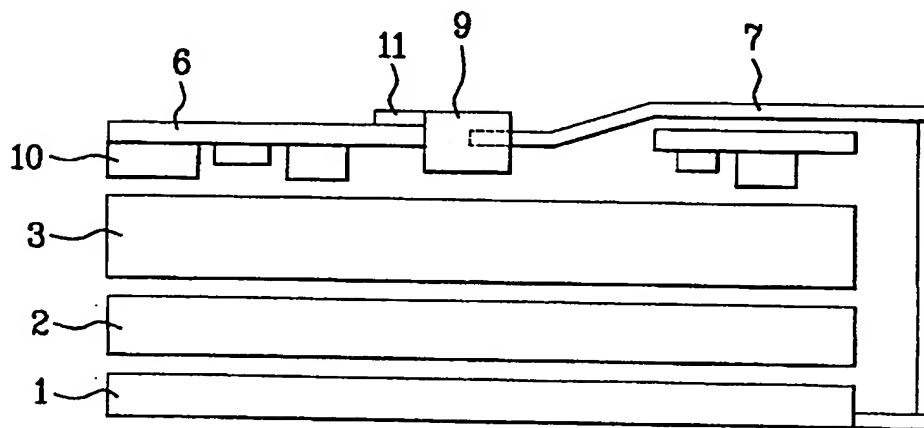


图 5

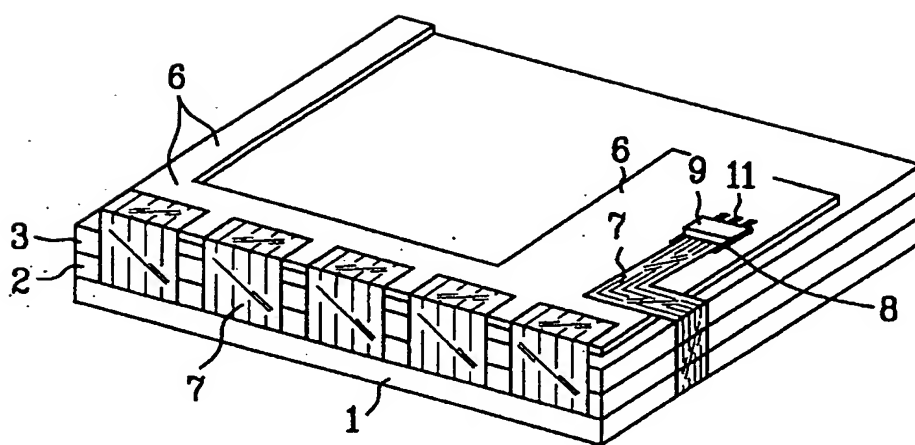


图 6